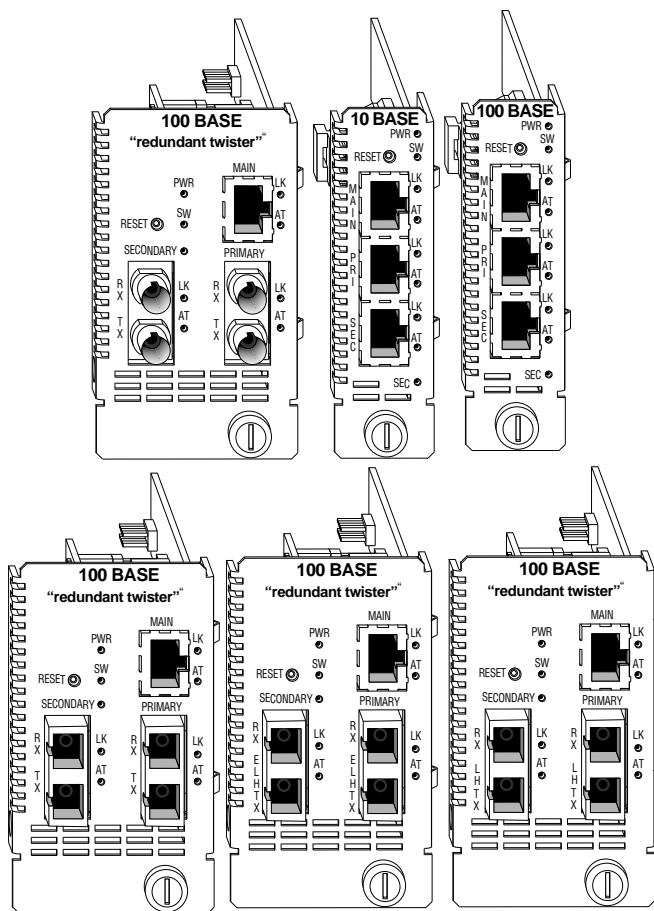# Lancast®
Intelligent 7500
"redundant twister"™ Module

Installation & User Guide

100Mbps Models: 7731-11-75 / 7731-13-75 / 7731-14-75 / 7731-15-75 /
 7731-16-75 / 7731-17-75 / 7731-1J-75 / 7732-11-75
10Mbps Models: 7711-11-75 / 7712-11-75

Lancast Intelligent "redundant twister" Modules

10Mbps without SONAR (Switch On No Activity Received)
      7711-11-75 ___ RJ-45 to redundant RJ-45

100Mbps without SONAR
      7731-11-75 ___ RJ-45 to redundant RJ-45
      7731-13-75 ___ RJ-45 to redundant FX multimode SC
      7731-14-75 ___ RJ-45 to redundant FX singlemode SC
      7731-15-75 ___ RJ-45 to redundant FX multimode ST
      7731-16-75 ___ RJ-45 to redundant FX singlemode ST
      7731-17-75 ___ RJ-45 to redundant FX singlemode SC (40km)
      7731-1J-75 ___ RJ-45 to redundant FX singlemode SC (100km)

10Mbps with SONAR
      7712-11-75 ___ RJ-45 to redundant RJ-45

100Mbps with SONAR
      7732-11-75 ___ RJ-45 to redundant RJ-45

Table of Contents

Intelligent 7500 "redundant twister" Module Installation & User Guide

Overview

The Lancast Intelligent 7500 "redundant twister" module offers the resiliency of data link redundancy to ensure network integrity with no down time. This link duplication provides the nonstop networking capability essential for high priority traffic and mission-critical applications. The intelligent "redundant twister" modules provide full redundant data paths for Ethernet or Fast Ethernet devices. The Fast Ethernet intelligent "redundant twister" modules also provide 100BASE-TX to FX conversion. The intelligent "redundant twister" module actively monitors the primary link and if it fails, automatically activates the secondary link without interruption to network operation.

The 7712-11-75 and 7732-11-75 incorporate SONAR (Switch On No Activity Received). With SONAR enabled, the module provides protection against loss of data activity in addition to link integrity.

The addition of management functionality allows communication between the chassis and a management station providing software control over the intelligent "redundant twister" module configuration and notification of a failure to the management station.

The intelligent "redundant twister" module has the following features:

- Can be configured to operate in Dynamic Recovery Mode (DRM) to ensure session integrity and increased uptime.

- Can be configured to operate in Network Select Mode (NSM) to redirect and isolate traffic adding extra security.

- Immediately switches over from the primary link to the secondary link if the primary link fails.

- In addition to switching on loss of link, the 7712-11-75 and 7732-11-75 can be configured to switch on loss of data (SONAR).

- Provides minimal impact on the round trip delay for communication in half-duplex collision domains.

- Fast Ethernet modules demonstrate a maximum loss of 2-3 packets (measured with minimum packet size and minimum inter-packet gap) during fail-over transition.

- All twisted-pair ports are equipped with an MDI-ll to MDI-X switch to eliminate the need for crossover cables.

- Can be configured to return automatically to the primary link after the failure condition is resolved or only upon secondary failure; or manually switched back to primary after fail-over.

- Supports full- and half-duplex operation.

- Supports auto-polarity on all twisted-pair ports.

- In addition to providing link and data on the active ports, the 7732-11-75 intelligent "redundant twister" modules can be configured to provide link or link and redundant transmit data on the inactive port.

- Link Loss Carry Forward[*] enable/disable functionality.

- Functions with devices configured for auto-negotiation.

- Fused power on each module protects the system from a short circuit. This prevents a faulty module from bringing down the entire system.

The Lancast Intelligent "redundant twister" module is available in 10 models and can be installed in any Metrobility chassis. Each model contains a MAIN port, a PRIMARY port and a SECONDARY port. Redundancy is provided between the PRIMARY and SECONDARY ports. Because of the size of the intelligent "redundant twister" fiber optic modules, each TX-FX module uses two slots in the chassis. The TX-TX module uses only one slot.

Model Number	Mbps	Connectors	Maximum Supported Link Length
771x-11-75	10	RJ-45 to redundant RJ-45	100m/100m
773x-11-75	100	RJ-45 to redundant RJ-45	100m/100m
7731-13-75	100	RJ-45 to redundant FX multimode SC	100m/2km
7731-14-75	100	RJ-45 to redundant FX singlemode SC	100m/15km
7731-15-75	100	RJ-45 to redundant FX multimode ST	100m/2km
7731-16-75	100	RJ-45 to redundant FX singlemode ST	100m/15km
7731-17-75	100	RJ-45 to redundant FX singlemode SC	100m/40km
7731-1J-75	100	RJ-45 to redundant FX singlemode SC	100m/100km

7711-11-75
7712-11-75

7731-1J-75

7731-11-75
7732-11-75

7731-13-75
7731-14-75

7731-15-75
7731-16-75

7731-17-75
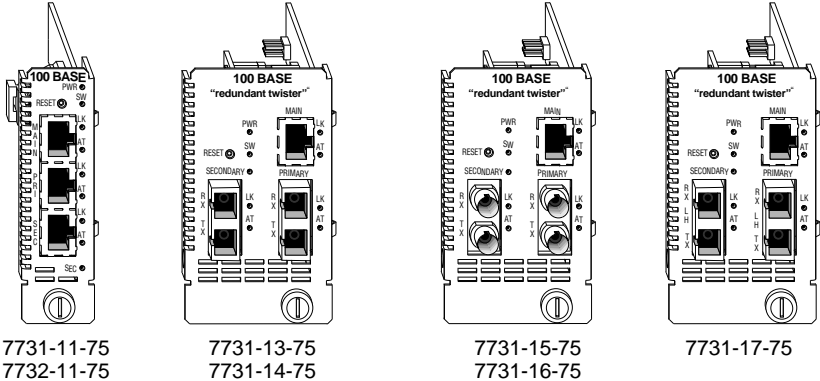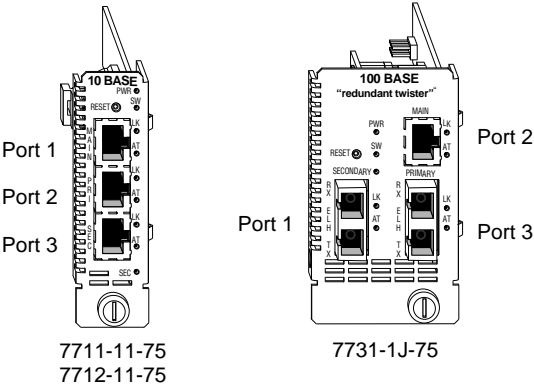
Installation Guide

Follow the simple steps outlined in this section of the manual to install and start using your Lancast intelligent "redundant twister" module.

NOTE: Electrostatic discharge precautions should be taken when handling any module. Proper grounding is recommended (i.e., wear a wrist strap).

1 Unpack the Intelligent "redundant twister" Module

Your order has been provided with the safest possible packaging, but shipping damage does occasionally occur. Inspect your order carefully for damage that may have occurred during shipment. If you discover any shipping damage, notify the carrier and follow their instructions for damage and claims. Save the original shipping carton if return or storage of the unit is necessary.

2 Set the DIP Switches

A set of DIP switches, located on the module board, provide user-selectable configurability options for several modes of operation. These switches are clearly marked on the module's printed circuit board. Refer to the table on the following pages for the proper setting of the DIP switches.[*]
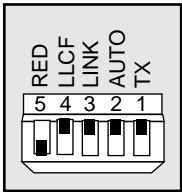
7711-11-75
7731-XX-75
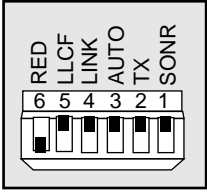
7712-11-75
7732-11-75

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* DIP switches can also be managed via console commands or through Metrobility's NetBeacon™ or WebBeacon™ management software. Refer to the **Lancast Intelligent 7500 Command Line Interface Reference Guide**, **NetBeacon™ Element Management Software Installation & User Guide** or **WebBeacon™ Management Software Installation & User Guide** for software management information.

7711-11-75 and 7731-xx-75: The DIP switches for these modules can be set for the following operational functions:

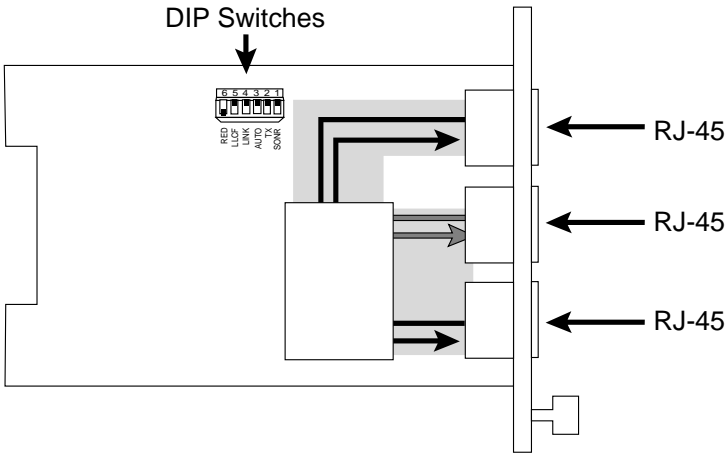| Switch Name	Position*	Operation
TX	UP	Transmits data on both the PRIMARY and SECONDARY ports simultaneously. LINK must be enabled on both ports. For 100Mbps units, it is only applicable in Dynamic Recovery Mode (DRM).
	DOWN *(default)*	Transmits data on the active port only.
AUTO	UP	In DRM, automatically reverts the active port back to the PRIMARY port when the primary link is re-established. In Network Select Mode (NSM), sets the default active port to SECONDARY.
	DOWN *(default)*	In DRM, does not revert the active port back to the PRIMARY port when a primary link is reestablished until the SECONDARY link fails. If the SECONDARY link does not fail, the SECONDARY port remains active. Use the RESET push button located on the front of the module to force the active port back to the PRIMARY port and to clear the SW LED. In NSM, sets the default active port to PRIMARY.
LINK	UP	Link signals are sent out on both the PRIMARY and SECONDARY ports (i.e. link is sent out both ports). For 100Mbps units, it is only applicable in DRM.
	DOWN *(default)*	Link signals are sent out on the active port only. With the LINK switch in this position, data is <u>not</u> transmitted out the inactive port regardless of the TX switch setting.
LLCF	UP	Link Loss Carry Forward is enabled.
	DOWN *(default)*	Link Loss Carry Forward is disabled.

* When setting the DIP switches, the UP position is when the DIP switch lever is pushed away from the circuit board. The DOWN position is when the DIP switch lever is pushed toward the printed circuit board.

Switch Name	Position	Operation
RED	UP *(default)*	Operates in Dynamic Recovery Mode. If the PRIMARY link fails, the SECONDARY port becomes active. Refer to the description of the AUTO switch.
	DOWN	Operates in Network Select Mode. Use the RESET push button to toggle between PRIMARY and SECONDARY. In NSM, the AUTO switch sets the initial active port on power up. Up is SECONDARY and down is PRIMARY.

DIP Switches

RJ-45

FX SC (ST)

FX SC (ST)

DIP Switches

RJ-45

RJ-45

RJ-45
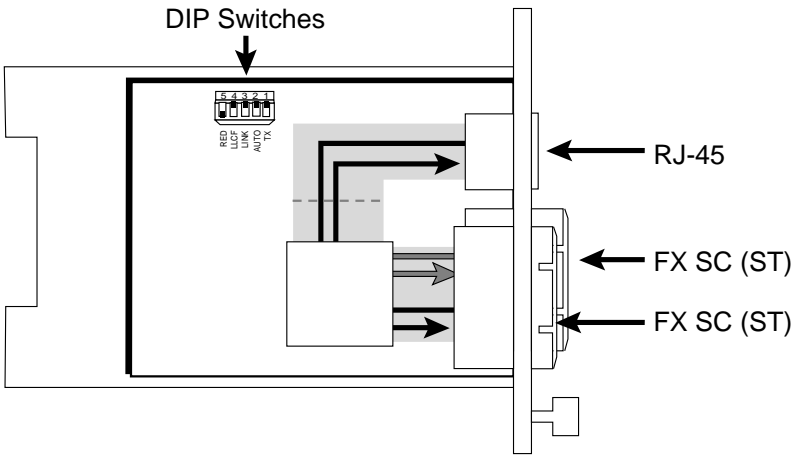
7712-11-75 and 7732-11-75: The table below describes the operational functions for the DIP switches on the Radiance redundant line card with SONAR.

Switch Name	Position*	Operation
SONR	UP	SONAR is enabled. To properly activate SONAR, the RED and LINK switches also must be enabled.
	DOWN *(default)*	SONAR is disabled.
TX	UP	Transmits data on both the PRIMARY and SECONDARY ports simultaneously. The LINK switch must be enabled on both ports.
	DOWN *(default)*	Transmits data on the active port only.
AUTO	UP	In Network Select Mode (NSM), sets the default port to SECONDARY. In Dynamic Recovery Mode (DRM), the active port automatically reverts back to the PRIMARY port when the primary link is reestablished. If SONAR is enabled, activity detection is also required before the active port reverts back to PRIMARY.
	DOWN *(default)*	In NSM, sets the default port to PRIMARY. In DRM, the active port does not revert back to the PRIMARY port when the primary link is reestablished or if activity is detected (SONAR enabled). Use the RESET push button located on the front of the card to force the active port back to PRIMARY and to clear the SW (switchover) LED. Note: The active port reverts back to PRIMARY if the SECONDARY port has no link or a loss of activity for two (2) seconds (SONAR enabled) and the PRIMARY port has a valid link and data is detected (SONAR enabled).

* When setting DIP switches, the UP position is when the lever of the switch is pushed away from the circuit board. The DOWN position is when the lever of the switch is pushed toward the circuit board.

Switch Name	Position	Operation
LINK	UP	Link signals are sent out on both the PRIMARY and SEC-ONDARY ports (i.e. link is sent out both ports).
	DOWN *(default)*	Link signals are sent out on the active port only. Note: The TX switch is ignored in this setting.
LLCF	UP	Link Loss Carry Forward is enabled.
	DOWN *(default)*	Link Loss Carry Forward is disabled.
RED	UP *(default)*	Operates in Dynamic Recovery Mode (DRM). If the primary link fails and the secondary link is present, the SECOND-ARY port becomes active. When SONAR is enabled, if the PRIMARY port loses activity for two (2) seconds and activity is present on the SEC-ONDARY port, then the SECONDARY port becomes active.
	DOWN	Operates in Network Select Mode (NSM). Use the RESET push button to toggle between PRIMARY and SECOND-ARY. Use the AUTO switch to set the initial active port on power up.

3 Set the MDI-II/MDI-X Switch

For every twisted-pair port, a switch is used to implement the transmit and receive crossover functionality. The switch is positioned just behind its associated RJ-45 connector. On TX-FX modules, the switch is hidden from direct view by the smaller daughter circuit board. Use a small paperclip for easy access. Refer to the illustration below for the location of the MDI-ll/MDI-X switch(es):
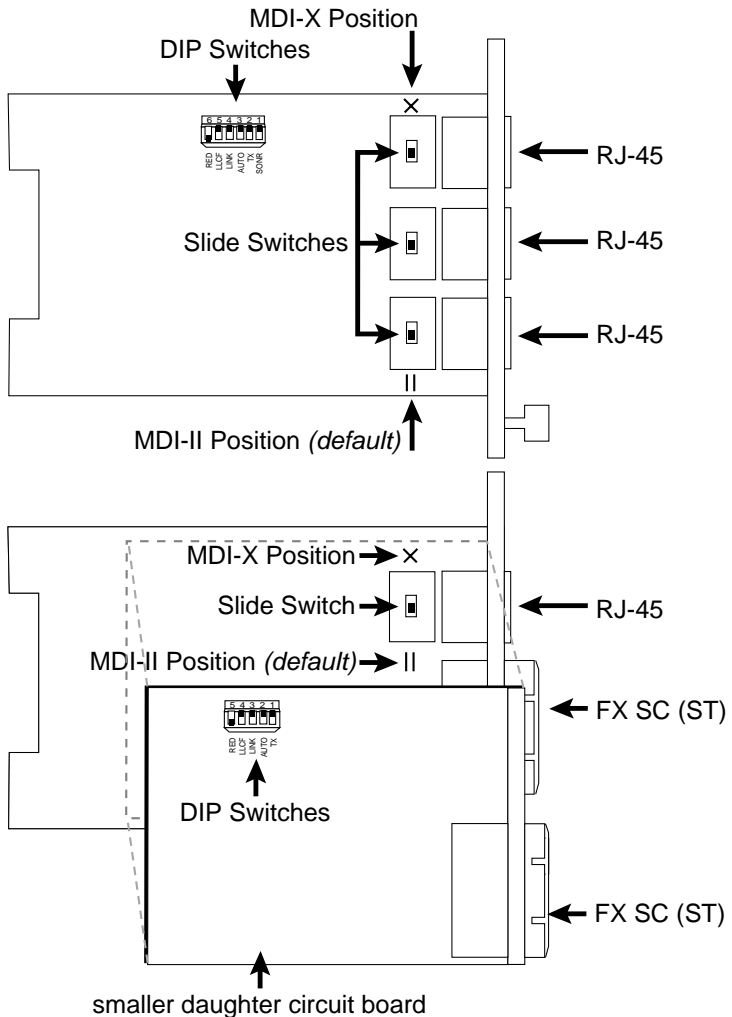
The switch connects the transmit and receive signal pairs in either straight through or crossover configurations.

The signal routing is as follows:

Switch Position	Connection
$\|\|$	TX+ to TX+ TX- to TX- RX+ to RX+ RX- to RX-
$\times$	TX+ to RX+ TX- to RX- RX+ to TX+ RX- to TX-

When setting the MDI-ll/MDI-X switch, observe the positioning of the following symbols:
- the parallel symbol (**ll**) indicates a straight through or parallel connection *(default)*
- the cross symbol (**X**) indicates a crossover connection.

These two symbols are clearly marked on the printed circuit board. Simply slide the switch in the direction of the appropriate symbol. Because of the smaller space between boards on TX-FX modules, use a paperclip to reach in and push or pull the switch toward the appropriate symbol.
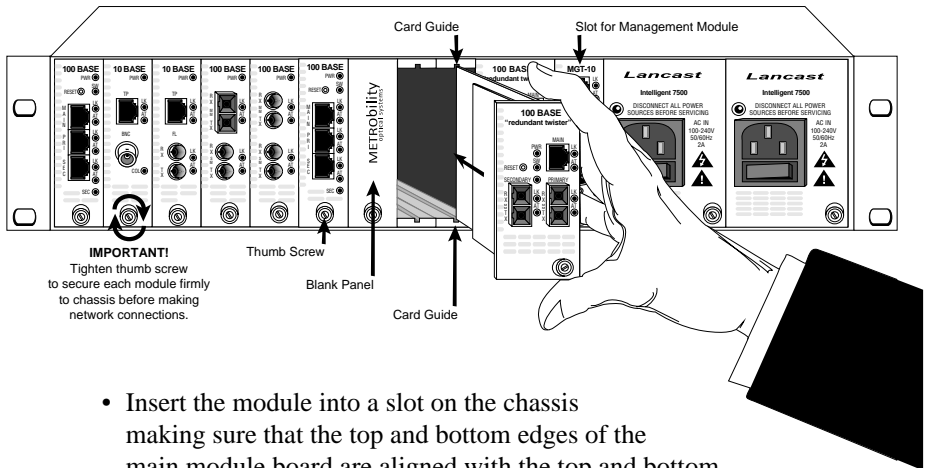
4 Install the Intelligent "redundant twister" Module

Lancast intelligent "redundant twister" modules offer the ease of plug-and-play installation and are hot-swappable. All modules must be firmly secured to the chassis before network connections are made. Follow the simple steps outlined below to install the intelligent "redundant twister" module:

NOTE: Each TX-FX module uses two slots in the chassis. The TX-TX module uses only one.

• Grasp the module by the front panel as shown.

Card Guide

Slot for Management Module

IMPORTANT!
Tighten thumb screw to secure each module firmly to chassis before making network connections.

Thumb Screw

Blank Panel

Card Guide

• Insert the module into a slot on the chassis making sure that the top and bottom edges of the main module board are aligned with the top and bottom card guides in the chassis. Do not force the module into the chassis unnecessarily. It should slide in easily and evenly.

• Slide the module in until the top and bottom edges of the front panel are flush and even with the top and bottom edges of the chassis.

• Turn the thumbscrew clockwise until it is snug to secure the module to the chassis. The intelligent "redundant twister" module is now properly installed and ready for connection to the network.

5

Connect to the Network

A total of three connections must be made on the front panel when connecting the intelligent "redundant twister" module to the network. Be sure that all modules are firmly secured to the chassis before making network connections.

- Connect to the MAIN port.
  Each intelligent "redundant twister" module provides one shielded RJ-45 jack for 10BASE-T/100BASE-TX connections and supports a maximum segment length of 100 meters over Category 3 or 5 twisted-pair cable for 10Mbps and Category 5 twisted-pair cable for 100Mbps.

  Refer to STEP 3 for MDI-ll to MDI-X switch functionality. Before making the proper twisted-pair connection, verify the port configuration of the connected device.

Embedded Parallel Function		**Embedded Crossover Function**	
Device with Straight Through TP Port Configuration	"redundant twister" TP Port Configuration	"redundant twister" TP Port Configuration	Typical Hub TP Port Configuration

A device that is wired straight through, needs one crossover connection:	
If the cable is…	… the MDI-II to MDI-X Switch Setting should be
straight through	**X**
crossover	**ll**

A device that is wired crossover, needs a parallel connection:	
If the cable is…	… the MDI-II to MDI-X Switch Setting should be
straight through	**ll**
crossover	**X**

  If you do not know the internal wiring configuration of the other device's RJ-45 port, consult the product documentation.

- Connect to the PRIMARY port.
- Connect to the SECONDARY port.
  The 771x-11-75 and 773x-11-75 intelligent "redundant twister" modules provide two additional RJ-45 jacks for 10BASE-T/100BASE-TX connections and support a maximum segment length of 100 meters over Category 3 or 5 twisted-pair cable for 10Mbps segments and Category 5 twisted-pair cable for 100Mbps segments.

The 7731-13-75 and 7731-15-75 intelligent "redundant twister" modules provide two sets of 100BASE-FX multimode SC or ST connectors that support a maximum segment length of 2km.

The 7731-14-75 and 7731-16-75 intelligent "redundant twister" modules provide two sets of 100BASE-FX singlemode SC or ST connectors that support a maximum cable length of 15km.

The 7731-17-75 and 7731-1J-75 intelligent "redundant twister" modules provide two sets of 100BASE-FX singlemode SC connectors. The 7731-17-75 supports a maximum segment length of 40km. The 7731-1J-75 supports a maximum cable length of 100km.

When making fiber optic connections, make sure that the transmit (TX) optical conductor of the intelligent "redundant twister" module connects to the receive (RX) optical conductor of the connected device; and make sure that the transmit (TX) optical conductor of the device connects to the receive (RX) optical conductor of the intelligent "redundant twister" module for both the PRIMARY and SECONDARY links.

Use the link (LK) LEDs on the front panel of the module to verify correct segment connectivity. As you insert the cable into each port, the LK LED illuminates provided there is power being applied to the chassis and that there is an active device connected to the other end of the cable sending idle link signals.
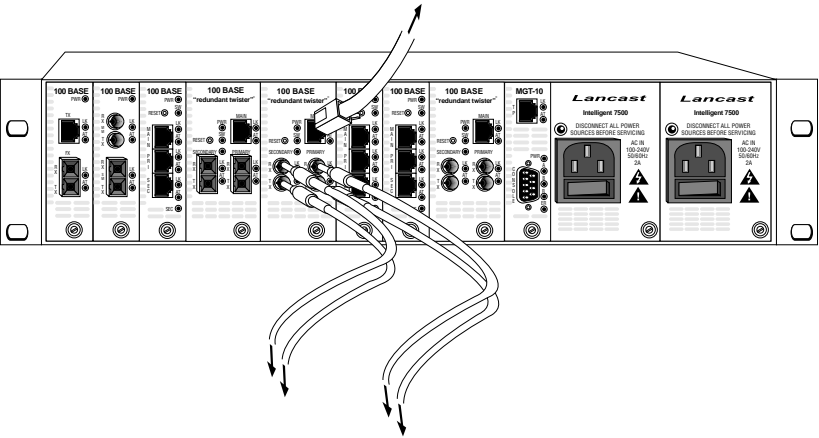
User Guide

This section contains more detailed information regarding the operating features of the intelligent "redundant twister" module.

Module LED Operation

Several LEDs are visible from the front panel. These include SW, PWR, SECONDARY, LK and AT LEDs. There are separate LK and AT LEDs for each of the three ports (MAIN, PRIMARY and SECONDARY). Refer to the table below for a description of each LED.

The function of each LED is as follows:

LED Label	Color (Status)	Indication
SW	Amber (steady)	SECONDARY port was the active port at some point.
PWR	Green (steady)	Power ON
SECONDARY	Green (steady)	SECONDARY active
	(off)	PRIMARY active
(MAIN) LK	Green (steady)	Receive link present
(MAIN) AT	Green (blinking)	Receiving data
(PRIMARY) LK	Green (steady)	Receive link present
(PRIMARY) AT	Green (blinking)	Receiving data
(SECONDARY) LK	Green (steady)	Receive link present
(SECONDARY) AT	Green (blinking)	Receiving data

Reset Push Button

A small RESET push button is located on the front panel of the intelligent "redundant twister" module. When used in conjunction with the module's SW and SEC-ONDARY LEDs and the AUTO DIP switch setting, this push button allows you to effectively maintain or troubleshoot a PRIMARY link connection.

Because of its small size and recessed placement within the front panel, press the RESET push button with the tip of a pointed object. Pushing and holding the RESET push button has no effect. It is the act of pressing the push button that causes a reset.

In the event of a PRIMARY link failure, pressing the RESET push button has the following effects:

| If the AUTO switch is UP and RED switch is UP	The active port automatically reverts to PRIMARY when primary link is reestablished and pressing the RESET switch clears the SW LED.
If the AUTO switch is DOWN and RED switch is UP	The active port does not automatically revert to PRIMARY when a primary link is reestablished. Pressing the RESET switch clears the SW LED and the SECONDARY LED and forces the PRIMARY port to be the active port. If the SECONDARY link is disabled, it reverts to the PRIMARY if the PRIMARY has a good link.
	If there is only a SECONDARY link, then the SW and SECONDARY LEDs remain lit and pressing the RESET switch has no effect.
If the RED switch is DOWN	The module operates in Network Select Mode (NSM). The RESET push button toggles the active link between the PRIMARY and SECONDARY ports.

Link Loss Carry Forward (LLCF)

The Lancast intelligent "redundant twister" modules have been designed with a LLCF function for troubleshooting a remote connection. The modules are shipped with LLCF disabled.

When LLCF is enabled, the fiber optic ports as well as the twisted-pair ports on the module do not transmit a link signal until they receive a link signal from the opposite port. For example, if LLCF is enabled and two intelligent "redundant twister" modules are connected via a fiber cable with nothing else connected to them, the Link LED does <u>*not*</u> illuminate. When a valid link is established at the twisted-pair port, a complete connection is accomplished.

The diagram below shows a typical network configuration using an intelligent "redundant twister" module for remote connectivity:
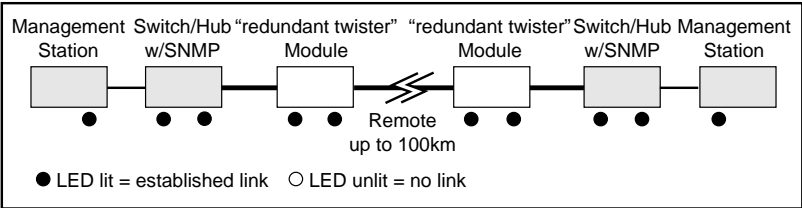
If the fiber connection breaks, or the remote device fails, the intelligent "redundant twister" module carries that link loss all the way to the switch/hub which generates a trap to the management station. The administrator can then look at the module to determine the source of the loss.
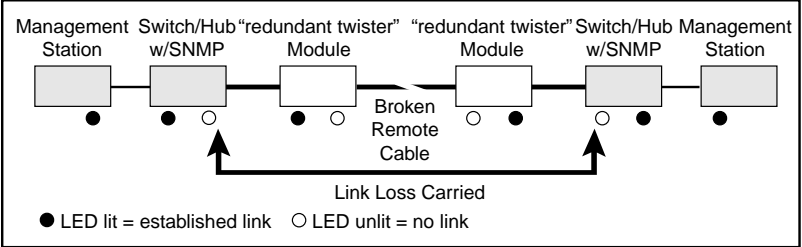
IMPORTANT: When connecting a "redundant twister" module to a port that supports auto-negotiation, it is strongly recommended to fix the port setting to the appropriate speed (100Mbps or 10Mbps) and to either full or half duplex. This allows the "redundant twister" module to sense receive link and select the active port.

Switch On No Activity Received (SONAR)

The 7712-11-75 and 7732-11-75 are designed to protect a network from failure that would prevent data from reaching their destination. With SONAR enabled, the module monitors the active port for loss of data activity, as well as loss of a valid link. SONAR enables the "redundant twister" to automatically change its active port to its backup when the following two conditions occur:

- No data activity is detected on the active port for two (2) seconds.
- Data activity is detected on the backup port.

To switch active ports, the backup port must have data activity within the two-second time-out period when the active port lost activity. If both ports have no activity, the port that receives data activity first becomes the active port.

The active port is switched immediately if it loses its link and the backup port has a link.

To properly activate SONAR, make sure that the following switches are enabled:
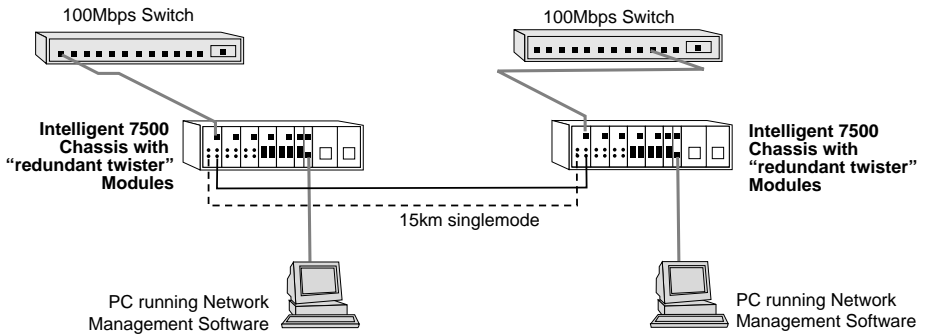1. RED switch. This sets the "redundant twister" to operate in Dynamic Recovery Mode.

2. LINK switch. This allows link signals to be sent out both ports.

3. SONAR switch.

The settings of the other DIP switches do not affect SONAR operation. However, SONAR will override the Auto Restore Primary Circuit (AUTO) switch. If both SONAR and AUTO are enabled, the active port will not automatically revert to the primary port (after switching to the secondary port) if the primary port has link but no activity. Data activity on the primary port must also be detected during the two-second time-out period before the active port reverts back to the primary port.

NOTE: The 7712-11-75 and 7732-11-75 are shipped with SONAR disabled. In addition to the hardware switch setting, SONAR can be enabled via console commands or by using WebBeacon or NetBeacon management software (version 2.0 or later). Refer to the **Command Line Interface Reference Guide***,* **NetBeacon Element Management Software Installation & User Guide** *or* **WebBeacon Software Installation & User Guide** *for software instructions.*
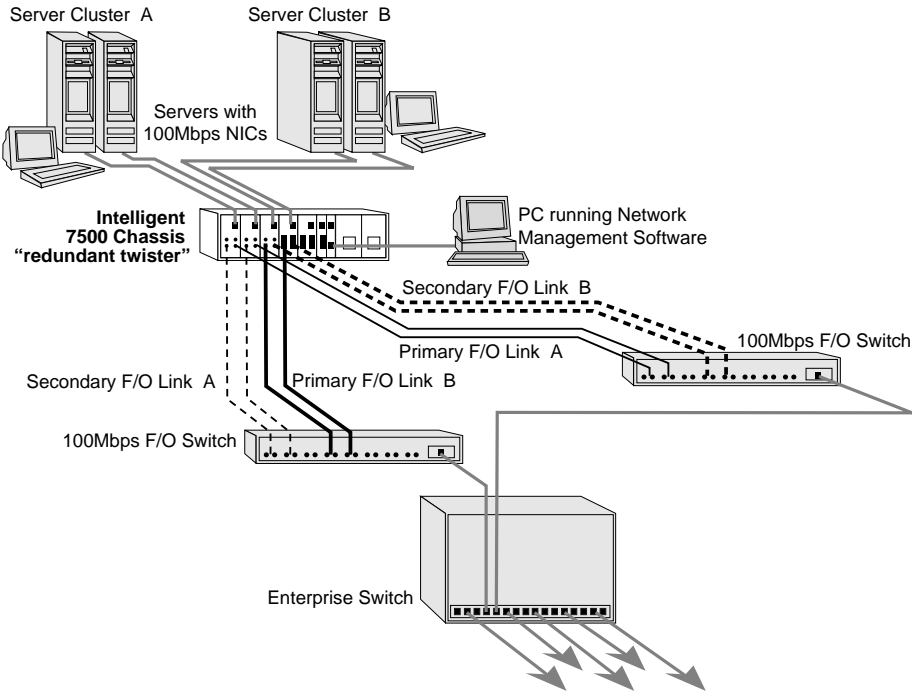
Back-to-Back Application

A typical application of the "redundant twister" is to use them in pairs to extend a network's reach between two remote devices. In the back-to-back setup, both primary ports are linked to each other and both secondary ports are linked to each other as shown in the figure below.

In a back-to-back application, make sure that the following switches are enabled on both "redundant twister" modules:

1. RED switch. Sets the "redundant twister" to operate in Dynamic Recovery Mode. In this mode, the secondary port automatically becomes the active port if the primary link is lost and the secondary link is present.

2. TX switch. Allows the "redundant twister" to transmit data on both the primary and secondary ports simultaneously. The modules must have this switch enabled because they cannot determine which port is active on the other "redundant twister".

3. LINK switch. This allows link pulses to be sent out both the primary and secondary ports. If neither secondary port is transmitting link pulses and one of the primary ports loses link, a switchover will NOT occur. A switchover will occur only if the secondary port has link.

Topology Solution

Server Cluster A   Server Cluster B

Servers with
100Mbps NICs

**Intelligent
7500 Chassis
"redundant twister"**

PC running Network
Management Software

Secondary F/O Link B

Primary F/O Link A

100Mbps F/O Switch

Secondary F/O Link A   Primary F/O Link B

100Mbps F/O Switch

Enterprise Switch

Technical Specifications

Data Rate

7711-11-75, 7712-11-75
        Half duplex _____ 10Mbps
        Full duplex _____ 20Mbps
7731-xx-75, 7732-11-75
        Half duplex _____ 100Mbps
        Full duplex _____ 200Mbps

10Mbps Twisted-Pair Interface (7711-11-75, 7712-11-75)

Connector _____ Shielded RJ-45, 8-pin jack
Impedance _____ 100 Ohms nominal
Signal Level Output (differential) _____ 2.2 to 2.8V
Signal Level Input _____ .3 to 3.1V p-p
Supported Link Length _____ 100m
Cable Type _____ Category 3 or 5 UTP
        (For EN55024:1998 compliance, use only Category 5 STP cables.)

100Mbps Twisted-Pair Interface (7731-xx-75, 7732-11-75)

Connector _____ Shielded RJ-45, 8-pin jack
Impedance _____ 100 Ohms nominal
Signal Level Output (differential) _____ .95 to 1.05V
Signal Level Input _____ 350mV minimum
Supported Link Length _____ 100m
Cable Type _____ Category 5 UTP
        (For EN55024:1998 compliance, use only Category 5 STP cables.)

100Mbps Multimode Fiber Optic Interface (7731-13-75, 77-15-75)

Connector _____ ST or SC
RX Input Sensitivity _____ -31 dBm peak minimum
Output Power _____ -14 dBm to -23.5 dBm (50/125 μm)
        _____ -14 dBm to -20 dBm (62.5/125 μm)
Supported Link Length _____ up to 2km full duplex
Cable Type _____ 50/125, 62.5/125, 100/140 μm F/O

100Mbps Singlemode Fiber Optic Interface (7731-14-75, 7731-16-75)

Connector _____ ST or SC
RX Input Sensitivity _____ -31 dBm peak minimum
Output Power _____ -8 dBm to -15 dBm (9/125 μm)
Supported Link Length _____ up to 15km full duplex
Cable Type _____ 8.3/125, 8.7/125, 9/125, 10/125 μm F/O

100Mbps Singlemode Fiber Optic Interface—Long Haul (7731-17-75)

Connector _____ SC
Wavelength _____ 1300nm
RX Input Sensitivity _____ -35 dBm maximum
Output Power _____ 0 dBm to -5 dBm (9/125 μm)
Supported Link Length _____ up to 40km full duplex
Cable Type _____ 8.3/125, 8.7/125, 9/125, 10/125 μm SM F/O

100Mbps Singlemode Fiber Optic Interface—Extended Long Haul (7731-1J-75)

Connector _____ SC
Wavelength _____ 1550nm
RX Input Sensitivity _____ -37 dBm minimum
Output Power _____ 0 dBm to -3.01 dBm (9/125 μm)
Supported Link Length _____ up to 100km full duplex
Cable Type _____ 8.3/125, 8.7/125, 9/125, 10/125 μm SM F/O

Power Requirements

771x-11, 773x-11 _____ 5 VDC @ 0.750Amps, 3.75W
7731-13, -14, -15, -16, -17, -1J _____ 5 VDC @ 1.3Amps, 6.5W

Environmental

Operating Temperature _____ 0 to 50° C
Storage Temperature _____ -30 to 70° C

Operating Humidity _____ 5% to 95% non-condensing
Weight   _____ 5 oz (0.14 kg)

Product Safety, EMC and Compliance Statements

This equipment complies with the following requirements:

- UL
- CSA
- EN60950 (safety)
- FCC Part 15, Class A
- EN55022 Class A (emissions)
- EN55024: 1998 (immunity)
- IEEE 802.3/802.3u
- IEC 825-1 Classification
- Class 1 Laser Product
- DOC Class A (emissions)

This product shall be handled, stored and disposed of in accordance with all governing and applicable safety and environmental regulatory agency requirements.

The following *FCC* and *Industry Canada* compliance information is applicable to North American customers only.

USA FCC Radio Frequency Interference Statement
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Caution: Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Canadian Radio Frequency Interference Statement
This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.

Warranty and Servicing

Three-Year Warranty for the Lancast "redundant twister"

Metrobility Optical Systems, Inc. warrants that every Lancast "redundant twister" will be free from defects in material and workmanship for a period of THREE YEARS. This warranty covers the original user only and is not transferable. Should the unit fail at any time during this warranty period, Metrobility will, at its sole discretion, replace, repair, or refund the purchase price of the product. This warranty is limited to defects in workmanship and materials and does not cover damage from accident, acts of God, neglect, contamination, misuse or abnormal conditions of operation or handling, including overvoltage failures caused by use outside of the product's specified rating, or normal wear and tear of mechanical components.

To establish original ownership and provide date of purchase, please complete and return the registration card or register the product online at **www.metrobility.com**. If product was not purchased directly from Metrobility, please provide source, invoice number and date of purchase.

To return a defective product for warranty coverage, contact Metrobility Customer Service for a return materials authorization (RMA) number. Send the defective product postage and insurance prepaid to the address provided to you by the Metrobility Technical Support Representative. Failure to properly protect the product during shipping may void this warranty. The Metrobility RMA number must be clearly on the outside of the carton to ensure its acceptance.

Metrobility will pay return transportation for product repaired or replaced in-warranty. Before making any repair not covered by the warranty, Metrobility will estimate cost and obtain authorization, then invoice for repair and return transportation. Metrobility reserves the right to charge for all testing and shipping costs incurred, if test results determine that the unit is without defect.

This warranty constitutes the buyer's sole remedy. No other warranties, such as fitness for a particular purpose, are expressed or implied. Under no circumstances will Metrobility be liable for any damages incurred by the use of this product including, but not limited to, lost profits, lost savings, and incidental or consequential damages arising from the use of, or inability to use, this product. Authorized resellers are not authorized to extend any other warranty on Metrobility's behalf.
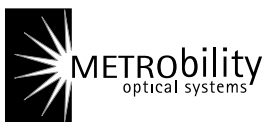
Product Manuals

The most recent version of this manual is available online at
http://www.metrobility.com/support/manuals.htm

To obtain additional copies of this manual, contact your reseller, or call
1.877.526.2278 or 1.603.880.1833

Product Registration

To register your product, go to
http://www.metrobility.com/support/registration.cfm

25 Manchester Street, Merrimack, NH 03054 USA
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www.metrobility.com

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